JC10 Rec'd PCT/PTO 28 MAR 2002

FORM PTO-1390 (REV 12-2001) U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER: Mic.6688

U.S. APPLICATION NO. (If known, see 37 CFR 1.5): 10/089425

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/DE00/01737	29 May 2000	2 June 1999

TITLE OF INVENTION: CIRCUIT COMPRISING AN INTEGRATED SWITCHING CIRCUIT AND A VOLTAGE REGULATING CIRCUIT

APPLICANT(S) FOR DO/EO/US: Stefan EDER

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. [x] This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. [ ] This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. [ ] This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (21) indicated below.
4. [ ] The US has been elected by the expiration of 19 months from the priority date (Article 31).
5. [x] A copy of the International Application as filed (35 U.S.C. 371(c)(2))
   a. [x] is attached hereto (required only if not communicated by the International Bureau).
   b. [ ] has been communicated by the International Bureau.
   c. [ ] is not required, as the application was filed in the United States Receiving Office (RO/US).
6. [ ] An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
   a. [ ] is attached hereto.
   b. [ ] has been previously submitted under 35 U.S.C. 154(d)(4).
7. [ ] Amendments to the claims of the International Aplication under PCT Article 19 (35 U.S.C. 371(c)(3))
   a. [ ] are attached hereto (required only if not communicated by the International Bureau).
   b. [ ] have been communicated by the International Bureau.
   c. [ ] have not been made; however, the time limit for making such amendments has NOT expired.
   d. [ ] have not been made and will not be made
8. [ ] An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371 (c)(3))
9. [ ] An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. [ ] An English lanugage translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11 to 20 below concern document(s) or information included:

11. [x] An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. [ ] An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. [ ] A FIRST preliminary amendment.
14. [ ] A SECOND or SUBSEQUENT preliminary amendment.
15. [ ] A substitute specification.
16. [ ] A change of power of attorney and/or address letter.
17. [ ] A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825.
18. [ ] A second copy of the published international application under 35 U.S.C. 154(d)(4).
19. [ ] A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).
20. [x] Other items or information: Petition to Revive an Unintentional Abandoned Application with a check for $1,280.00

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U.S. APPLICATION NO (If known, see 37 CFR 1.5)	INTERNATIONAL APPLICATION NO	ATTORNEY'S DOCKET NUMBER
10/089425		

21. ☐ The following fees are submitted:	CALCULATIONS PTO USE ONLY	
BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)):		
Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO **$1040.00**		
International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO **$890.00**		
International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO **$740.00**		
International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4) **$710.00**		
International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) **$100.00**		
ENTER APPROPRIATE BASIC FEE AMOUNT =	$ 890.00	
Surcharge of **$130.00** for furnishing the oath or declaration later than ☐ 20 ☒ 30 months from the earliest claimed priority date (37 CFR 1.492(e)).	$ 130.00	

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	- 20 =		x **$18.00**	$	
Independent claims	- 3 =		x **$84.00**	$	
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ **$280.00**	$ 280.00	
TOTAL OF ABOVE CALCULATIONS =				$ 1,300.00	
☐ Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2.			+	$	
SUBTOTAL =				$ 1,300.00	
Processing fee of **$130.00** for furnishing the English translation later than ☐ 20 ☒ 30 months from the earliest claimed priority date (37 CFR 1.492(f)).				$ 130.00	
TOTAL NATIONAL FEE =				$	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). **$40.00** per property +				$	
TOTAL FEES ENCLOSED =				$ 1,430.00	
				Amount to be refunded:	$
				charged:	$

a. ☒ A check in the amount of $ 1,430.00 to cover the above fees is enclosed.

b. ☐ Please charge my Deposit Account No. _____ in the amount of $ _____ to cover the above fees. A duplicate copy of this sheet is enclosed.

c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 19-0079 A duplicate copy of this sheet is enclosed.

d. ☐ Fees are to be charged to a credit card. **WARNING:** Information on this form may become public. **Credit card information should not be included on this form.** Provide credit card information and authorization on PTO-2038.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137 (a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

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Patrick O'Shea
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NAME

35,305
REGISTRATION NUMBER

Specification

Circuit Comprising an Integrated Switching Circuit and a Voltage Regulating Circuit

This invention relates to a circuit comprising an integrated switching circuit and a voltage regulating circuit, which furnishes a regulated voltage for the operation of the circuit.

Circuits are constructed from electrical and/or electronic components as well as integrated circuits on an insulating board. The connections between the components and circuits are made via conductor paths. The energy necessary for the operation of the circuit is fed in the form of a supply voltage. For proper functioning of the circuit, the value of the supply voltage must lie in a certain range. If an available voltage is unsuitable as a supply voltage because of excessively large voltage fluctuations, a constant supply voltage can be obtained with a voltage regulating circuit.

Voltage regulating circuits are discrete components that, from an input voltage that can lie in a certain range, deliver a nearly constant output voltage largely independently of the load on the output of the voltage regulating circuit. The voltage regulating circuit generates, for example from the available fluctuating voltage, the constant supply voltage that is required for the proper operation of the circuit. The voltage regulating circuit is mounted on the board along with the other discrete components and the integrated circuits.

An example of such a circuit is an ISDN adapter for a personal computer with a universal interface (USB – Universal Serial Bus – interface) interface),

which can be obtained under the designation "Siemens I-Serve USB." The adapter includes a board, on which a voltage regulating circuit is present along with some integrated circuits and discrete components, some of which are surface-mounted devices (SMD). The voltage regulating circuit in turn includes a plurality of components and circuits and forms its own functional unit. It is connected to the other components via conductor paths. Via the serial bus, for example, the voltage regulating circuit includes the voltage to be regulated. The population of the board with the components of the voltage regulating circuit requires additional time. A larger area must be provided on the board in order to accommodate the voltage regulating circuit. This gives rise to additional costs.

The goal of the present invention is to identify a circuit, comprising an integrated switching circuit and a voltage regulating circuit, which takes up less area than known circuits of the kind stated and requires less effort in the population of boards.

This goal is achieved by a circuit having the features of Claim 1.

The invention has the advantage that the circuit can be mounted on a smaller area. During assembly, for example on a board, fewer components have to be attached and contacted. The effort in designing the topographies is reduced.

In one embodiment, there is an internal connection between the switching circuit and the voltage regulating circuit. The internal connection is also integrated on the substrate material, as are the two circuits. Advantageously, the voltage regulating circuit is additionally connected to a contact that is accessible outside the circuit. In this way, the supply voltage can be fed both to the

switching circuit and also to further circuits independent of the circuit.

In a further embodiment, there is no internal connection between the voltage regulating circuit and the switching circuit. The supply voltage is fed to the switching circuit from outside. It does not necessarily have to originate from the voltage regulating circuit itself but can also be furnished from an external voltage source. Preferably there is a switch for this purpose, with which the selection is made between the voltage regulating circuit and the external voltage source.

Further advantageous embodiments are characterized in the dependent claims.

In what follows, the invention is explained in greater detail on the basis of exemplary embodiments illustrated in the figures. Corresponding elements are identified by the same reference numerals. The figures show:

Figure 1: a first embodiment with an internal connection between the integrated switching circuit and the voltage regulating circuit

Figure 2: a second embodiment with an internal connection

Figure 3: a first embodiment with an external connection between the integrated switching circuit and the voltage regulating circuit

Figure 4: a second embodiment with an external connection.

According to one embodiment as shown in Figure 1, the circuit exhibits an integrated switching circuit 1 and a voltage regulating circuit 2. A data bus 3 connects the circuit to a main device 4. Main device 4 is, for example, a computer (PC) that is upgraded with a function that is implemented by switching circuit 1.

Data bus 3 supplies the circuit with a supply voltage V having a first potential VDD and a second potential VSS as well as for the exchange of data D-, D+ between switching circuit 1 and main device 4.

In order to obtain a constant supply voltage, the supply voltage V delivered via data bus 3 from main device 4 is fed to voltage regulating circuit 2. The voltage regulating circuit generates a regulated supply voltage VG, which is largely constant even in case of fluctuations of the supply voltage VDD, VSS.

Regulation of the supply voltage is necessary, as a rule, if the supply voltage V delivered from main device 4 is subject to fluctuations that are too large for the proper operation of the circuit.

Both switching circuit 1 and voltage regulating circuit 2 are integrated on a substrate material. Suitable as the substrate material is, for example, a semiconductor substrate, on which all components of switching circuit 1 and of voltage regulating circuit 2 are implemented and connected into the desired circuits in a unified technological process. The components can also be mounted on a glass or ceramic substrate. Circuits 1 and 2 form a unit and are mounted, for example, in a package.

There can be an electrical connection between switching circuit 1 and voltage regulator 2. Circuits 1 and 2 can, however, also be electrically isolated from each other.

Any contacts and outputs of switching circuit 1 that may be present are not shown in Figure 1.

In the exemplary embodiment according to Figure 1, there is an internal connection 5 between voltage regulating circuit 2 and switching circuit 1. The regulated supply voltage VG of voltage regulating circuit 2 is furnished to switching circuit 1 via this internal connection 5 as the

voltage necessary for the operation of switching circuit 1. Internal connection 5 thus makes an electrical connection between circuits 1 and 2.

Internal connection 5 is again present in the exemplary embodiment of Figure 2. This exemplary embodiment has all the elements of the exemplary embodiment of Figure 1. In addition, voltage regulator 2 in this case includes a voltage contact 6 at which the regulated supply voltage VG can be taken off. Voltage contact 6 is led out of the substrate material of voltage regulator 2. Voltage contact 6 is accessible outside the circuit even if the circuit is mounted in a package.

An additional device 7, for the operation of which a regulated supply voltage VG is likewise required, can be connected via voltage contact 6. In this case, voltage regulating circuit 2 supplies both switching circuit 1 and also additional device 7 with the regulated supply voltage VG.

Additional device 7 is not integrated on the substrate material. It is a free-standing device that can be operated without the circuit.

In the exemplary embodiment of Figure 3, there is no internal connection between voltage regulating circuit 2 and switching circuit 1. Insulation 8 electrically isolates switching circuit 1 from voltage regulating circuit 2. The regulated supply voltage VG is not fed to switching circuit 1 within the circuit. Switching circuit 1 is supplied via an external linking line 9, which is connected to voltage contact 6. Because of insulation 8, the regulated supply voltage of voltage regulating circuit 2 can be taken off only via the voltage contact. The voltage contact can be built up from a plurality of contacts. External linking line 9

is connected to supply contacts 10 as well as to voltage contact 6. Supply contacts 10 are electrically connected to switching circuit 1. Switching circuit 1 is supplied with the voltage necessary for operation via the supply contacts.

Insulation 8 must be such that the regulated supply voltage VG does not affect switching circuit 1 if no linking line 9 is connected to voltage contact 6. Exchange of charge carriers between switching circuit 1 and voltage regulating circuit 2 can nevertheless be possible.

Along with external linking line 9, additional device 7 can also be connected to voltage contact 6, as it is in the exemplary embodiment of Figure 2. Voltage regulating circuit 2 then supplies both additional device 7 and also, via external linking line 9 and supply contacts 10, switching circuit 1 with the regulated supply voltage VG. The supply voltage VDD, VSS is delivered from main device 4 to voltage regulating circuit 2 via data bus 3. Data exchange between main device 4 and switching circuit 1 also takes place via data bus 3.

A further exemplary embodiment of a circuit, in which switching circuit 1 is electrically isolated from voltage regulating circuit 2, is shown in Figure 4. As in the exemplary embodiment of Figure 3, circuits 1 and 2 are isolated by insulation 8. Here, voltage contact 6 is connected to external linking line 9 not directly but via a first switch 11. If first switch 11 is closed, a connection is made between voltage contact 6 and supply contacts 10. Again, there can be additional device 7, which is connected to external linking

line 9 in such a way that it is supplied with the regulated supply voltage VG when first switch 11 is closed.

External linking line 9 is connected to an external voltage source 13 via a second switch 12. The two switches 11, 12 are designed in such a way that only one of the switches can be closed at any time. If first switch 11 is opened, second switch 12 is closed. If second switch 12 is opened, first switch 11 is closed. This switching condition can be imposed, for example, by an appropriate mechanical device or a suitable electronic control.

In the exemplary embodiment of Figure 4, switching circuit 1 and additional device 7, if present, can be supplied from voltage regulating circuit 2 or external voltage source 13, as selected. External voltage source 13 likewise generates the regulated supply voltage VG. It is not integrated on the substrate material and is connected to external linking line 9, for example via a connecting line.

The supply via external voltage source 13 can be present, for example, if the power furnished via data bus 3 is not sufficient for the operation of switching circuit 1. Switching circuit 1 can be operated even in case of a defective voltage regulating circuit 2.

The circuit can be embodied, in particular, with a switching circuit for telecommunications purposes, for example ISDN (Integrated Services Digital Network) adapter.

Claims

1. Circuit comprising an integrated switching circuit (1) integrated on a substrate material,

characterized in that a voltage regulating circuit (2) for the provision of a supply voltage (VG) is also integrated on the substrate material.

2. Circuit according to Claim 1,

characterized in that there is an internal connection (5) in the circuit for feeding the supply voltage (VG) from the voltage regulating circuit (2) to the switching circuit (1).

3. Circuit according to Claim 2,

characterized in that the voltage regulating circuit (2) exhibits a contact (6) accessible outside the circuit, at which the supply voltage (VG) can be taken off.

4. Circuit according to Claim 1,

characterized in that, on the substrate material, the switching circuit (1) is electrically isolated from the voltage regulating circuit (2) and the voltage regulating circuit (2) exhibits a contact (6) accessible outside the circuit, at which the supply voltage (VG) can be taken off.

5. Circuit according to Claim 4;

characterized in that the contact (6) is connected to the switching circuit (1) via an electrical connection (9) led outside the substrate material.

6. Circuit according to Claim 5,

characterized in that the contact (6) is connected to the switching circuit (13) via a switch (11).

7. Circuit according to one of Claims 1 to 6,

characterized in that the switching circuit (1) is designed for telecommunications purposes and is controllable via a data bus (3).

[In Figures 1-4:]

Spannungsregler = voltage regulator

(12) NACH DEM VERTRAG ÜBER DIE INTERNATIONALE ZUSAMMENARBEIT AUF DEM GEBIET DES PATENTWESENS (PCT) VERÖFFENTLICHTE INTERNATIONALE ANMELDUNG

(19) Weltorganisation für geistiges Eigentum
Internationales Büro

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199 25 422.2 2. Juni 1999 (02.06.1999) DE

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(81) Bestimmungsstaaten *(national)*: JP, KR, US.

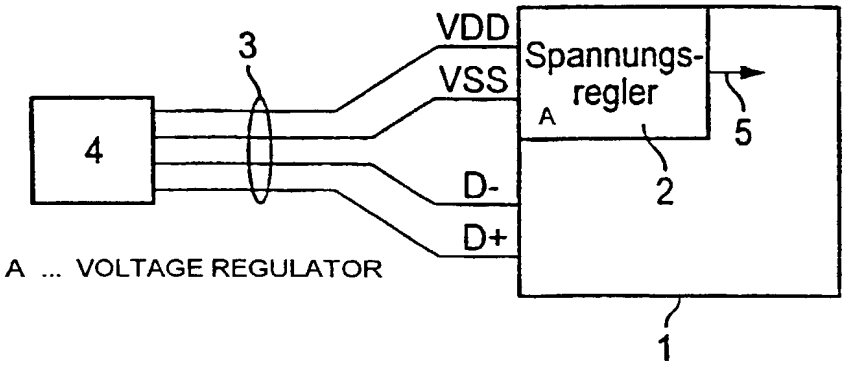
(84) Bestimmungsstaaten *(regional)*: europäisches Patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

Veröffentlicht:
— *Mit internationalem Recherchenbericht.*
— *Vor Ablauf der für Änderungen der Ansprüche geltenden Frist; Veröffentlichung wird wiederholt, falls Änderungen eintreffen.*

Zur Erklärung der Zweibuchstaben-Codes, und der anderen Abkürzungen wird auf die Erklärungen ("Guidance Notes on Codes and Abbreviations") am Anfang jeder regulären Ausgabe der PCT-Gazette verwiesen.

(54) Title: CIRCUIT COMPRISING AN INTEGRATED SWITCHING CIRCUIT AND A VOLTAGE REGULATING CIRCUIT

(54) Bezeichnung: SCHALTUNGSANORDNUNG MIT INTEGRIERTEM SCHALTKREIS UND SPANNUNGSREGELKREIS



(57) Abstract: A stabilized power supply voltage is required in order to operate a plurality of electronic circuits. In the case of circuits, in particular, which are supplied with voltage via a data bus, only one non-regulated power supply voltage is available. The invention provides that, in addition to the switching circuit, a voltage regulation circuit for carrying out the original function is integrated in the circuit. By integrating the voltage regulating circuit, the provision of an external voltage regulator is no longer necessary.

(57) Zusammenfassung: Zum Betrieb vieler elektronischer Schaltungen ist eine stabilisierte Versorgungsspannung notwendig. Insbesondere bei Schaltungsanordnungen, die über einen Datenbus mit Spannung versorgt werden, steht nur eine ungeregelte Versorgungsspannung zur Verfügung. Die Erfindung sieht vor, daß in der Schaltungsanordnung neben dem Schaltkreis für die eigentliche Funktion auch ein Spannungsregelkreis integriert ist. Durch die Integration des Spannungsregelkreises entfällt die Notwendigkeit eines externen Spannungsreglers.

WO 00/73870 A1

FIG 1

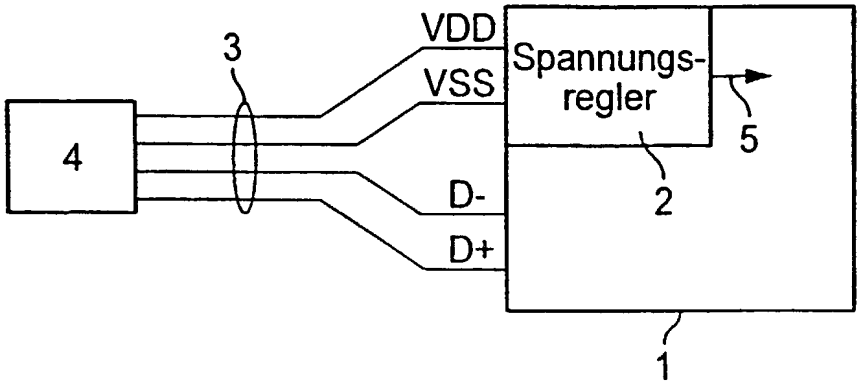

VDD
VSS
D-
D+
3
4
Spannungs-
regler
2
5
1

FIG 2

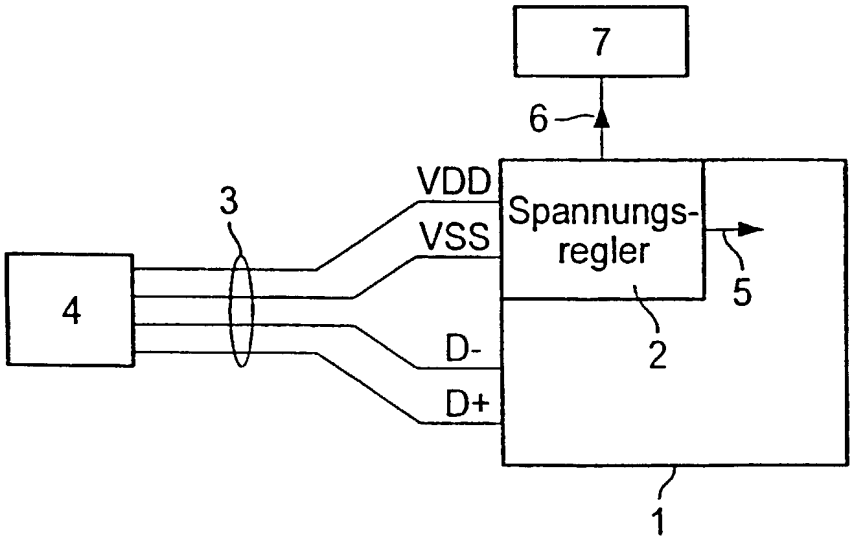

7
6
VDD
VSS
D-
D+
3
4
Spannungs-
regler
2
5
1

FIG 3

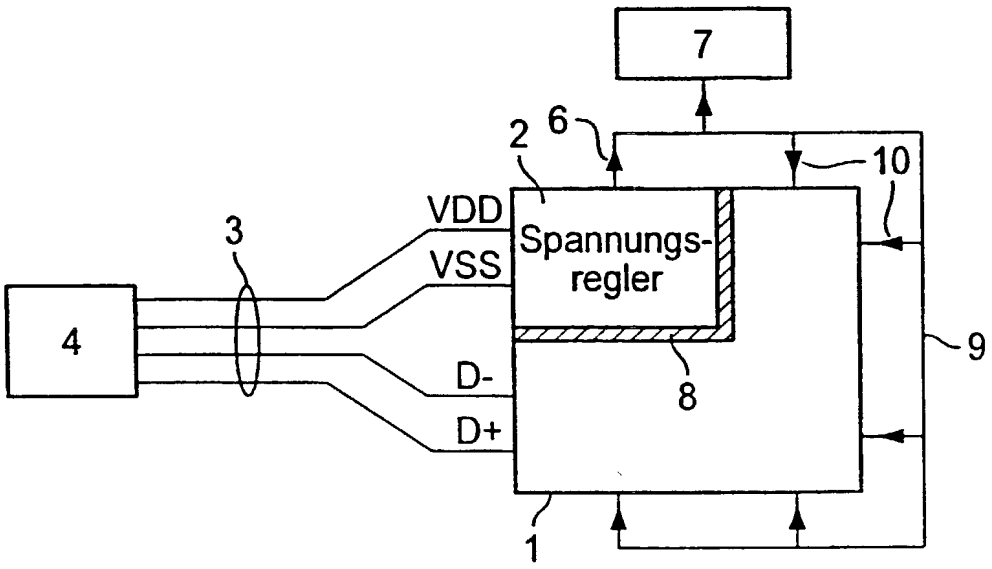
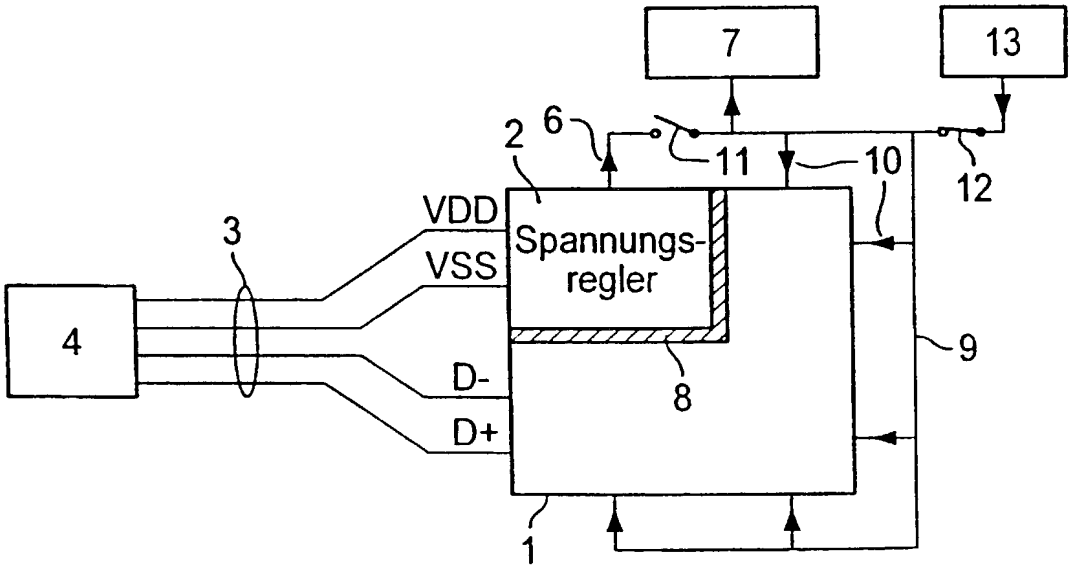

7
2
6
10
VDD
VSS
Spannungs-
regler
3
4
9
D-
8
D+
1

FIG 4


7
13
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VDD
VSS
Spannungs-
regler
3
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D-
8
D+
1

Mic.6688

DECLARATION AND POWER OF ATTORNEY

I, the below named inventor, hereby declare that:

My residence, post office address, and citizenship are as stated below next to my name.

I believe I am the original, first, and sole inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled CIRCUIT COMPRISING AN INTEGRATED SWITCHING CIRCUIT AND A VOLTAGE REGULATING CIRCUIT, the specification which was filed with the United States Patent and Trademark Office on March 28, 2002 as Serial No. 10/089,425.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims.

I acknowledge the duty to disclose information which is material to patentability in accordance with Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code §119(a)-(d) of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate filed by me on the same subject matter having a filing date before that of the application on which priority is claimed: International Patent Application No. PCT/DE00/01737 filed May 29, 2000.

I hereby declare that all statements are made hereby of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

And I hereby appoint:

Maurice E. Gauthier	-	Reg. No. 20,798
Richard L. Stevens	-	Reg. No. 24,445
Matthew E. Connors	-	Reg. No. 33,298
William E. Hilton	-	Reg. No. 35,192
Patrick J. O'Shea	-	Reg. No. 35,305
Arlene J. Powers	-	Reg. No. 35,985
Richard L. Stevens, Jr.	-	Reg. No. 44,357
Peter Stecher	-	Reg. No. 47,259

all of the firm of Samuels, Gauthier & Stevens, my attorneys with full power of substitution and revocation, to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith.

I request that all correspondence be directed to:

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